



Review History of ADS-B Study and Implementation Task Force and ADS-B related developments by AN Conf/11 and APANPIRG

-Presented by Secretariat

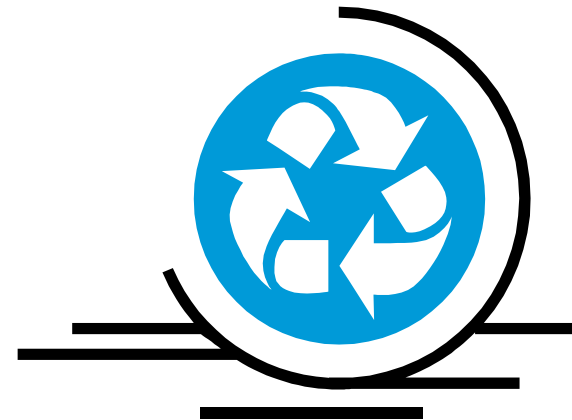


Contents of this presentation

- ✈ Global perspective for using ADS-B
 - Global Air Navigation Plan for CNS/ATM Systems, and
 - AN Conf/11;

- ✈ Regional perspective for using ADS-B
 - Actions taken by APANPIRG;

- ✈ History of ADS-B Task Force





Global Plan for CNS/ATM on ADS-B

- ➔ Global Air Navigation Plan for CNS/ATM Systems Doc9750 AN/963 2nd Edition 2002 recognizes ADS-broadcast (ADS-B*) as emerging technology for dissemination of aircraft position information.
- ➔ It was stated that using the technology, aircraft periodically broadcast their position to other aircraft as well as to ground systems. Any user, whether airborne or on the ground, within range of the broadcast, receives and processes the information. All users of the system have real-time access to precisely the same data, via similar displays, allowing a vast improvement in traffic situational awareness.
- ➔ It was envisaged to be applied for surface movement, thus being an alternative to surface radar such as airport surface Radar.



Global Plan for CNS/ATM

- ✈ A-SMGCS* will give ATM providers an enhanced surveillance capability of the aerodrome surface and will assist in taxi route planning and conflict detection/resolution.
- ✈ Surface movement management will become automated with aircraft/vehicle positional information being derived from on-board systems such as automatic dependent surveillance — broadcast (ADS-B)*.
- ✈ For the future trend: ADS-B* has the potential to complement SSR in terms of coverage (gap filler) and even to replace SSR for low- to medium-traffic density. If aircraft are adequately equipped, the ADS-B* information can also be used as a basis for a cockpit display of traffic information (CDTI)*.



Next Edition of Global Plan

- ➔ Global Plan was called *Global Coordinated Plan for Implementation of ICAO CNS/ATM Systems* before 3/1998;
- ➔ AN Conf/11 Rec. 1/9: “That ICAO develop a formal review and agreement process for the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750);
- ➔ Secretariat is developing a proposal for amendment of the Global Plan to incorporate the ATM Implementation Roadmap (From Concept to Reality) and to present the proposed amendment to the ANC for review in June 2005.



AN Conf/11 on ADS-B

- ✈ The 11th Air Navigation Conference (2003), held in Montreal from 22 Sep - 3 Oct , was attended by a total of 686 participants from 122 Contracting States and 24 observer delegations.
- ✈ 13-15 Jan 04, ANC reviewed and acted 52 of 61 recommendations and the ICAO Council, on 10 March 2004 approved the Report of AN-Conf/11. The Council, in confirming ICAO's role in the follow-up to recommendations, called upon States, international organizations, all PIRGs and all the CNS/ATM partners to initiate action on specific recommendations as necessary.



AN Conf/11 on ADS-B

Four recommendations directly related to ADS-B;

- ➔ 1/6 Endorsed “ADS-B concept of use”;
- ➔ 7/2 Support of longer term ADS-B requirements (ADS-B Link);
- ➔ 7/1 **Strategy for the near-term introduction of ADS-B:**

That States note that a common element in most of approaches currently adopted for early implementation of ADS-B is the selection of the SSR Mode S extended squitter as the initial data link; and

take into account this common element to the extent possible in their national and regional implementation choices in order to facilitate global interoperability for the initial introduction of ADS-B



AN Conf/11 on ADS-B

- ✈ ICAO issued State Letter ST 12/4-04-65 dated 30 June 2004 on follow-up action for recommendation 1/7 of AN-Conf/11 on ADS-B applications for global interoperability.
- a) *recognize ADS-B as an enabler of the global ATM operational concept bringing substantial safety and capacity benefits;*
 - b) *support the cost-effective early implementation of packages of ground and airborne ADS-B applications, noting the early achievable benefits from new ATM applications; and*
 - c) *ensure that implementation of ADS-B is harmonized, compatible and interoperable with respect to operational procedures, supporting data link and ATM applications.*



APANPIRG/13 Decisions

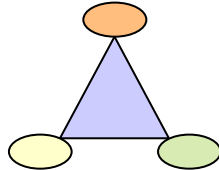


- 13th Meeting of APANPIRG held in Sep 02 made two decisions:
- Establishment of ADS-B Study and Implementation Task Force;
- Identified ADS-B as new key priority and included it in the list of key priorities for CNS/ATM System.



Driven by ADS-B related info.

→ Why?



- Australia, Mongolia (Sep/01) conducted ADS-B trials, USA Capstone project, Russian's intension, Northern European Trials;
- 1090ES; VDL Mode4; UAT???
- Australia offered to host the 1st TF meeting end of 2002.



1st Meeting of ADS-B TF

- ✈ The 1st TF meeting was held in Brisbane in March03 and attended by fifty-three experts from Australia, China, Hong Kong China, Fiji, India, Japan, New Zealand, Pakistan, Singapore, Thailand, United States, IATA, IFALPA and SITA.
- ✈ The meeting was also attended by representatives from Industries including Airbus, Boeing, Thales ATM. Honeywell and Sensis.



TOR of ADS-B TF

- ➔ Conduct a study for the selection of ADS-B link for use in the Asia/Pacific Region. The work to be addressed should include:
 - review the available link technology* for ADS-B and recommend the most suitable technology for selection as a preferred link for implementation in the Asia/Pacific Region in the near term and long term taking into account cost /benefit studies;
- ➔ identify and quantify near term and long term benefits of ADS-B;
- ➔ develop a recommended implementation plan including a recommended target date of implementation taking into account availability of SARPs and readiness of airspace users and ATS providers for a coordinated implementation of service and benefits.



Task Identified based on TOR

- ➔ Identify near term and long term benefits of ADS-B;
- ➔ Recommend the most suitable technology for selection as a preferred link for implementation in the near term;
- ➔ The cost impact on avionics of mandatory carriage of the ADS-B link selected;
- ➔ Recommend the most suitable technology for selection as a preferred link for implementation in the long term;
- ➔ Develop a recommended implementation plan including a target date for the mandatory carriage of the selected ADS-B link.



Review ADS-B related activities

- ✈ a) Reviewed OPLINK Panel ADS-B activity;
- ✈ b) Reviewed SASP ADS-B activity;
- ✈ c) Reviewed SCRSP
- ✈ D) AMCP ADS-B activities;
- ✈ d) Reviewed activities by Asia/Pacific States
in trials and demonstration of ADS-B;
- ✈ e) Reviewed the developments by Industries.



Draft Conclusion 1/2

➔ Draft Conclusion 1/2 - Needs for development of ICAO SARPs for ADS-B

That, ICAO consider, as high priority, in the technical work programme:

- ➔ a) the inclusion of positional source data accuracy and integrity requirements for ADS-B services in the appropriate standards; and
- b) development of separation standards for ADS-B surveillance.



APANPIRG Concl.14/22

➔ **Conclusion 14/22 - Needs for development of ICAO SARPs for ADS-B**

That, in view of the progress made by States with operational trials for the implementation of ADS-B, ICAO be requested to give priority to:

- a) the inclusion of positional source data accuracy and integrity requirements for ADS-B services in the appropriate standards; and
- b) development of separation standards for ADS-B surveillance**



Near term applications of ADS-B

- ✈ a) ground based radar-like services in areas not covered by radar ;
- ✈ b) support surface movement surveillance ;
- ✈ c) operational control for operators
-surveillance data to airlines;
- ✈ d) improve military-civil coordination based on common surveillance;
- ✈ E) SAR support ;
- ✈ F) provide enhanced pilot situational awareness.



Draft Conclusion 1/3

✈ Draft Conclusion 1/3 - Near term ADS-B datalink selection

That, Mode S Extended Squitter (1090 ES) be used as the datalink for ADS-B radar like services in the Asia/Pacific region for Air Transport category aircraft in the near term.





APANPIRG Concl. 14/20

✈ Conclusion 14/20 - Near term ADS-B datalink selection

That, Mode S Extended Squitter (1090 ES) be used as the data link for ADS-B radar like services in the ASIA/PAC Region in the near term.



The near term benefits identified

- ➔ a) Move from procedural to radar-like service;
- ➔ b) reduction in the cost of the provision of air traffic services through operational efficiencies;
- ➔ c) Enabling a seamless “gate-to-gate” surveillance service, not only to international civil aviation but should include general aviation and military operations;
- ➔ d) Increased safety and efficiency through the use of aircraft-derived data in a variety of systems;
- ➔ e) Increasing airport safety and capacity, especially under low visibility conditions;



The near term benefits identified

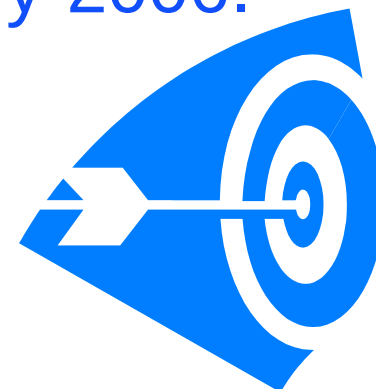
- ✈ f) Changes to airspace sectorisation and route structure resulting from improved surveillance;
- ✈ g) Reduced infrastructure costs;
- ✈ h) Cost savings achieved from ADS-B based surveillance system rather than the lifecycle expenses associated radar-based surveillance;
- ✈ i) Possibility of overall savings if associated with relevant navigation changes;
- ✈ j) Improved SAR efficiency;
- ✈ k) Reduced impact on the environment.



Draft Conclusion 1/4

✈ Draft Conclusion 1/4 - Target date of Implementation

That, States be encouraged to implement “ADS-B out” for ground-based surveillance services in Asia/Pacific region commencing January 2006.





APANPIRG Concl. 14/21

➔ Conclusion 14/21 - Target date of ADS-B Implementation

That States, where necessary to do so, be encouraged to implement “ADS-B out” for ground-based surveillance services in ASIA/PAC Region on a sub-region by sub-region basis with a target date of January 2006.



APANPIRG Decision 14/23 (1/1)

- ➔ The meeting identified the need for “the ADS-B Task Force” to provide ongoing monitoring and support ADS-B implementation issues.

(Draft Decision 1 / 1 - Revision of the Terms of Reference)

- ➔ **Decision 14/23 - Terms of Reference of ADS-B Task Force**

That, the new Terms of Reference of the ADS-B Study and Implementation Task Force be adopted as shown in Appendix D.



2ND Meeting of ADS-B TF

- ✈ The 2nd TF meeting was held in Bangkok in 22-26 March 2004 and attended by thirty-three experts from Australia, China, Hong Kong China, Fiji, India, Indonesia, Japan, Mongolia, New Zealand, Singapore, Sweden, Thailand, United States, IATA and SITA.
- ✈ The meeting was also attended by representatives from Industries including SENSIS and Thales ATM.



Revised TOR for ADS-B TF

- ✈ Complete an industry wide ADS-B cost/benefit study for the near term use of ADS-B throughout the ASIA/PAC Region.
- ✈ Develop an implementation plan for near term ADS-B applications in Asia Pacific including target dates taking into account available equipment standards and readiness of airspace users and ATS providers.

Note: 1.The Task Force, while undertaking the task, should take into account of the work being undertaken by OPLINK, SAS, SCRS and AMC Panels with a view to avoid any duplication.

2.The Task Force should report to the APANPIRG meeting to be held in 2004 and subsequent meetings.



The Major ADS-B activities had taken place since the 1st TF meeting were as:

- ✈ Japan is looking to ADS-B for supporting existing radar performance;
- ✈ Australia is deploying ADS-B in non radar areas;
- ✈ Indonesia envisages new sites (5 in phase 1 Stage 1). This is followed by 10 more in phase 1 Stages 2 & 3);
- ✈ India is looking to ADS-B as a supplement to radar to fill the gaps which are not covered by the radar. India proposes to conduct a trial at Chennai;



The Major ADS-B activities had taken place since the 1st TF meeting were as:

- ✈ Singapore, Japan and Australia envisage near term ADS-B in airport surface applications;
- ✈ China will conduct an ADS-B 1090ES trial at end 2004;
- ✈ Hong Kong, China is testing ADS-B on a airport surface;
- ✈ Mongolia is starting a 1090 ES ADS-B trial in conjunction with VDL Mode 4; and
- ✈ New Zealand has approval for an ADS-B trial over the South Island following a customer request.



APANPIRG Concl.15/25 (TF2/1)

✈ **Draft Conclusion 2/1 - Airlines plan for the deployment of ADS-B**

That, IATA be requested to conduct a survey of its member airlines' plan for the deployment of ADS-B in the ASIA/PAC region and provide result to the next meeting of the ADS-B Task Force or its Working Group.



Work done by ADS-B TF/2

- ➔ In order to develop an implementation plan at sub regional bases, a sample model business case for three specific city pairs was developed:
- ➔ City Pair 1: Sydney – Singapore;
- ➔ City pair 2 : Hong Kong, China – Tokyo;
- ➔ City Pair 3: Singapore- Delhi

A number of issues were also highlighted including: ;

- ➔ each State needs to evaluate the age of their radars and whether potential exists to replace them with ADS-B;
- ➔ there is a need to consider ADS-B in surface movement solutions



Work done by ADS-B TF/2

- ➔ ADS-B surveillance data sharing identified:
- ➔ Plan at the early stages of deployment to share data.
eg.: there is potential to share data at least in the following areas:
 - ➔ Australia & Indonesia (Christmas Is, Timor area, Bali...)
 - ➔ Australia & Papua New Guinea
 - ➔ Australia and Fiji
 - ➔ Australia and New Zealand
 - ➔ Indonesia & Singapore
 - ➔ China & Japan



APANPIRG Concl. 15/26 (TF2/2)

- ➔ ADS-B surveillance data sharing identified:
- ➔ **Conclusion 15/26 – Exchange of ADS-B surveillance data with neighbours**
- ➔ That, States be encouraged to share ADS-B surveillance data with neighbouring States and to develop mechanisms to achieve this as ADS-B ground infrastructure requirements are being identified during the design phase.



APANPIRG Decision 15/27 (TF2/4)

- ➔ The meeting formulated the following draft Decision which approved by APANPIRG:
- ➔ **Decision 15/27 – Subject/Tasks List of ADS-B Study and Implementation Task Force**

That, the Subject/Tasks List of the ADS-B Study and Implementation Task Force provided in Appendix H to the Report on Agenda Item 2.2 be adopted.



Work done by ADS-B TF/2

✈ Task Force established a problem-reporting database similar to that used successfully by ISPACG. The meeting endorsed the proposal of establishment of a database, which will be initially managed by Australia. Accordingly:

✈ www.airservicesaustralia.com/adsb/issues

User name: icao

Password: abit2004

Domain: leave this field blank



Definition of terms agreed

- ➔ **“Near-Term” means implementations, approximately in the next 5 years.** It was recognised that these implementations would have a life of at least 10 to 15 years.
- ➔ It was agreed by the Task Force that the highest priority of the Task Force should be on the near term implementation.
- ➔ **ADS-B air to ground surveillance (ADS-B OUT)** including both “ATC radar like services” and airport surface surveillance, using 1090ES downlink



WG Meeting of ADS-B TF

- ✈ The ADS-B WG meeting/Seminar was held in Singapore October 03 and attended by 46 participants from Australia, China, Hong Kong China, Fiji, India, New Zealand, Singapore, Thailand, United States, IATA, SITA;
- ✈ Representatives was also attended by representatives from Industries including Raytheon, Sensis, SES Systems Pte. Ltd, Thales ATM and Qinetiq,



Information presented to WG

- ➔ US Technical Standard Order (TSO)-C166 Extended Squitter ADS-B and TIS-B Equipment Operating on 1090 MHz became effective on 20 September 2004 which can be electronically downloaded at :
- ➔ http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/MainFrame?OpenFrameSe
- ➔ TSO-C166 is for manufacturers of 1090 MHz ADS-B and TIS-B equipment applying for a TSO authorization or approval of design.



Information presented WG

- ➔ Airbus has certified in 2003 three new Mode S transponders, capable of ELS (Elementary Surveillance), EHS (Enhanced surveillance) and 1090ES (Extended Squitter, first implementation of ADS-B out). These three Mode S transponders ELS/EHS/ES capable are:
- ➔ Honeywell TRA-67A, P/N 066-01127-1402
- ➔ Collins TPR-901, P/N 822-1338-021
- ➔ ACSS XS-950, P/N 7517800-10005



Surveillance data exchange format

- ➔ It was proposed to use Eurocontrol ASTERIX. Cat. 21 as data exchange format and noted that USA use ASTERIX Cat 33. Australia and USA were tasked to make further study contacting Eurocontrol for the latest development or version on data exchange format.
- ➔ **Decision 1/1 –ADS-B data exchange format**
That, members from Australia and USA conduct study on ADS-B data exchange format and present result to the next ADS-B Task Force meeting.



Information presented WG

- ➔ Thailand informed: a cost estimate for provision of a 9600 bps communication link between ADS-B site and the air traffic control centre in Thailand is about US\$ 4,800 covering both additional hardware to accommodate an extra communication link and initial installation. The cost estimate was based on the assumption that the ADS-B system would be installed at a location which already has a communication infrastructure (VSAT Network).



Information presented WG

- ➔ IATA informed: the estimated costs of an airline fitting various types of aeroplanes with ATC transponders and other necessary equipment to enable ADS-B out using 1090ES. Airlines have been installing Mode A, C, S 1090 MHz Transponders with and without the capability for extended squitter. The recent European mandate of EHS required transponders to be upgraded for ES. There is an additional cost to further upgrade the aeroplane wiring and systems to enable ADS-B air-ground surveillance service using 1090ES.



Information presented WG

- Singapore informed: Singapore plans to implement ADS-B in 3 phases as follows:
- Phase 1 (2006/7) involves the tracking of ground movement of vehicles with ADS-B transponders and ADS-B equipped aircraft. The ADS-B tracking be displayed at A-SMGCS at Tower.
- Phase 2 (2007/8), the ADS-B coverage extend up to 250 NM by installing a high-gain antenna.
- Phase 3 (2009/10) integrate ADS-B data into the new ATC system for ATC.
- The result of a trial conducted also presented.



Information presented WG

- ➔ A problem of inconsistencies in flight number/flight identification formats entered by flight crew in aircraft flight management systems:
- ➔ **Draft Conclusion 1/3 - Flight Identification Format**
That, IATA issue a reminder to directors of flight operations of its member airlines to use correct flight identification format required to enter into FMS or transponder.

Note: The aircraft identification entered should use the same as filled in item 7 of the ATS Flight Plan.



Decision made by WG

✈ Decision 1/4 - Develop a checklist for implementation of ADS-B at Sub-regional basis

That, member of ADS-B Task Force from New Zealand and Singapore develop a checklist for implementation of ADS-B at sub-regional basis and present to the next meeting of ADS-B study and implementation Task Force meeting.



Decision made by WG

✈ Decision 1/5 - Specific project proposals

That, co-ordinators of the city pair study teams define and present papers for specific, appropriate ADS-B implementation projects for which both benefits and costs can be calculated.



Decision made by WG

✈ Decision 1/6 –Use of ADS-B in an air space of North Asia

That, Member from IATA prepare and present a paper on study of using ADS-B technology in an airspace of North Asia at next Task Force meeting.



Decision made by WG

✈ Decision 1/7 - ADS-B Operational Manual (AOM)

That, members from New Zealand and USA rewrite the draft of ADS-B Operational Manual by the end of December 2004 and provide to OPLINKP in February 2005 for consideration before its review by the next ADS-B Task Force meeting in March 2005.



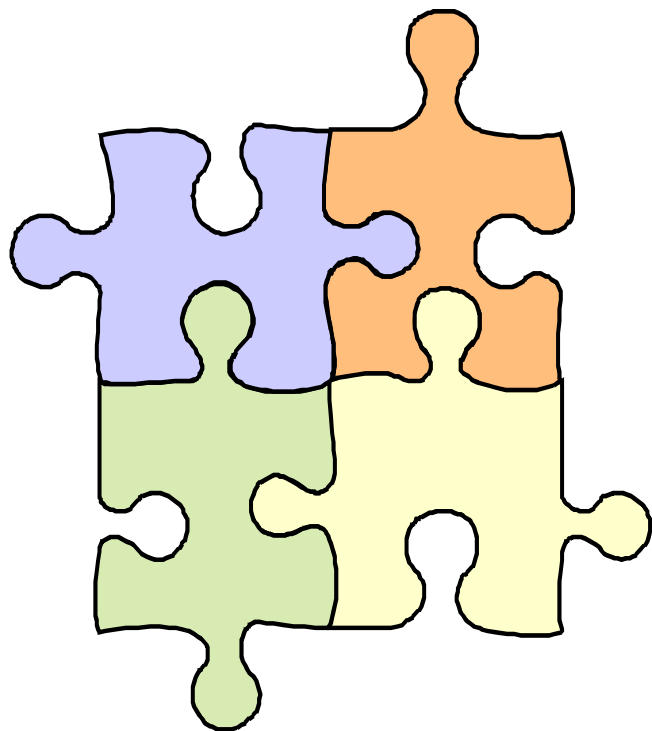
Information sharing

- ✈ Australia and USA offered to share their ADS-B study and implementation experience with other States. The meeting recognized the need to use the resource available in the Region to help individual States who may wish to visit the ADS-B site for one or two days to share lessons learnt and experience gained.
- ✈ Contact point for Australia will be Mr. Greg Dunstone and for USA will be Mr. Dennis R. Beres



Information sharing

- The meeting appreciated the live and recorded demonstrations on ADS-B provided by Raytheon, Sensis and Thales ATM during the Seminar and the meeting.
- It showed and demonstrated that ADS-B ground stations for demonstration could be setup within a few hours of arriving on site.



Any questions?

Thank you!!